FEB 2 8 1990

MEMORANDUM FOR: John E. Glenn, Chief
Medical, Academic, and Commercial
Use Safety Branch

THRU: Michael A. Lamastra, Section Leader
Commercial Section
Medical, Academic, and Commercial
Use Safety Branch

FROM: Anthony M. Huffert
Commercial Section
Medical, Academic, and Commercial
Use Safety Branch

SUBJECT: HERITAGE MINERALS, INC. AND NORD ILMENITE CORPORATION MEETINGS

On February 7, 1990, representatives from Heritage Minerals, Inc. and Nord Ilmenite Corporation met with representatives from the Office of Nuclear Material Safety and Safeguards, the Office of General Counsel, and NRC Region I to discuss source material licensing requirements for activities that involve separation and sale of mineral sands containing uranium and thorium. Enclosure 1 shows the agenda for these meetings and Enclosure 2 lists the participants.

In 1989, both companies submitted license applications to NRC Region I after it was determined that processing of the mineral sands concentrated source material to levels above 0.05 percent by weight, which requires operations to be authorized by an NRC license pursuant to 10 CFR 40.3. It was agreed that technical review of the applicants' radiation safety program would be performed by Region I and that review of the environmental report and decommissioning plan would be handled at Headquarters by the divisions of Industrial and Medical Nuclear Safety and Low-Level Waste Management and Decommissioning, respectively, through a Technical Assistance Request from Region I. According to the information contained in the applications, both company's operations are similar in nature, as were the regulatory deficiencies in their applications. The goals of these meetings were (1) to inform the applicants of the deficiencies found during the reviews; (2) to provide information and technical assistance for licensing purposes; and, (3) to gain a better understanding of each company's mineral processing, facilities and site.

Heritage Mineral Inc. was represented by their consultant, Dr. Max El Tawil, who presented an overview of the material processing operations and facilities at the 7,000 acre site. The handout from the presentation is provided as

Enclosure 3. According to the consultant, Hovson's Corporation bought the site from ASARCO in 1982 for real estate purposes and later decided to resume mineral processing operations under Heritage Minerals, Inc., a wholly owned subsidiary of Hovson's Corporation, when it was determined that the site contained concentrations of titanium, zircon and rare earths that could be extracted economically using newer processing techniques. Apparently, about 100 acres of land within the site contain 1,000,000 tons of tailings from former mineral extraction operations. The tailings in this area are currently being surveyed for uranium and thorium concentrations using gamma spectrometry analysis for identification of soil that is economically feasible for reprocessing. Heritage Minerals currently plans to reprocess soil from the 100 acre area that contains economic concentrations of source material, zircon and titanium. The tailings from this recovery operation are planned to be sold as construction sand and as concentrated monazite.

The remaining areas of the Heritage Minerals site are reported to contain little or no amounts of tailings and therefore exhibit radiation levels near background (7 microroentgens per hour).

In contrast to the large site at Heritage Minerals, Nord Ilmenite Corporation intends to operate its mineral extraction facility on a 30 acre site that was previously owned by Glidden Corporation. The site was purchased by Clayton Sand Company in 1978 for the purpose of selling construction sand located on the property. Nord Ilmenite will lease the site from Clayton and operate it until the estimated 300,000 tons of tailings are reprocessed. After economic concentrations of titanium, zircon and monazite are extracted from the tailings, the facilities are planned to be shipped elsewhere for future use. The mineral sand processing techniques and source material concentrations at the Nord Ilmenite site are similar to those used at Heritage Minerals. Enclosure 4 provides information about Nord Ilmenite's planned activities.

Also similar to Heritage Mineral's operations is Nord Ilmenite's proposal to sell all waste streams from the tailings recovery operations as construction sand and as concentrated monazite. As proposed, both company's operations will concentrate and remove monazite sand from the site, thereby reducing the overall concentration of source material at the site.

Heritage Mineral's and Nord Ilmenite's proposed decommissioning cost estimates of $4,000.00 per site was determined to be inadequate because their possession limits exceed 100 mCi, based on the reported stockpile of dry tailings. According to 10 CFR 40.36(a), "each applicant for a specific license authorizing the possession and use of more than 100 mCi of source material in a readily dispersible form shall submit a decommissioning funding plan." Additionally, 10 CFR 40.36(d) states that "each funding plan must contain a cost estimate for decommissioning and a method of assuring funds for decommissioning, including a means of adjusting cost estimates."

During the discussion on decommissioning, the consultant was advised to revisit his cost estimates and was given reference document DG-3002, which provides financial assurance guidance to applicants. It was pointed out that cost estimates should reflect decommissioning of facilities and grounds for unrestricted use.

Due to the similarity of operations at both companies and since the same consultant prepared their license applications, discussion of the deficiencies in both applications was effectively accomplished during the first meeting.

Based on the discussions of the mineral sands processing, the facilities, the site, and the operating schedule, the Office of General Counsel has reevaluated the environmental requirements of 10 CFR 51 as they apply to these activities. Enclosure 5 provides OGC's interpretation of 10 CFR 51.22(c)(14)(xiii), which provides a categorical exclusion from the requirements of an environmental assessment for certain licensing actions. Through analysis of information provided by the consultant and the Statement of Considerations for 10 CFR Part 51, OGC has concluded that this categorical exclusion is "legally available for these actions and can be utilized." However, it should be noted that according to 10 CFR 51.22(b), an environmental assessment may still be prepared if deemed appropriate by the staff, regardless of the availability of a categorical exclusion.

It is anticipated that further technical assistance to Region I from NMSS will be necessary during licensing, such as guidance on waste stream monitoring, review of final decommissioning plans, and other related issues. Licensing of Nord Ilmenite and Heritage Minerals is scheduled to continue as outlined in the TAR's from Region I.

-S-

Anthony M. Huffert
Commercial Section
Medical, Academic, and Commercial
Use Safety Branch
Division of Industrial and
Medical Nuclear Safety, NMSS

Distribution

AMHuffert	RBangart	RBoyle	LBykoski
IMNS Central Files	NRC File Center	TJohnson	RFonner
DMichaels	EShum	RUllrich, RI	GArlotto
IMAB r/f	JSwift	JKinneman, RI	RBernero
NMSS r/f	RECunningham	GSjoblom	JEGlenn
MALamastra			

OFC:	IMAB AH	:IMAB MA	:	:	:
NAME:	AMHuffert:ck/ht	:MALamastra	:	:	:
DATE:	02/28/90	:02/ /90	:	:	:

OFFICIAL RECORD COPY

AGENDA

Meeting Between Nord Ilmenite Corporation and NRC

February 7, 1990

3:00 PM Room 6-B-13

I.	Introduction
II.	Presentation by Nord Ilmenite
III.	Environmental Reporting Requirements
IV.	Radiation Safety Program Requirements
V.	Decommissioning and Financial Assurance Requirements
VI.	Licensing Schedules
VII.	Summary

Enclosure 1

AGENDA

Meeting Between Heritage Minerals, Inc. and NRC

February 7, 1990

1:00 PM Room 6-B-13

I.	Introduction
II.	Presentation by Heritage Minerals
III.	Environmental Reporting Requirements
IV.	Radiation Safety Program Requirements
V.	Decommissioning and Financial Assurance Requirements
VI.	Licensing Schedules
VII.	Summary

Attendance List for Meeting Between
Nord Ilmenite Corporation and NRC

February 7, 1990

	NAME	AFFILIATION
1.	Tony Huffert	IMNS/IMAB
2.	Betsy Ullrich	RI - NMSS-B
3.	Mike LAMASTRA	IMNS/IMAB
4.	LOUIS BILJSKI	LLWD/LLRB
5.	TERRY LANG	NORD Resources
6.	Paul J. Lehon	NORD Ilmenite
7.	Edward Stamm	LLW/NMSS
8.	Jerry J. Swift	NMSS/IMSB
9.	Max El Tawil	Nord Ilmenite
10.	Dorothy Michaels	OGC
11.	Robert L. Fonner	OGC
12.		
13.		
14.		
15.		

Enclosure 2

Attendance List for Meeting Between
Heritage Minerals, Inc. and NRC

February 7, 1990

	NAME	AFFILIATION
1.	Tony Huffert	IMNS/IMAB
2.	Bill [illegible]	RI - NMSS-B
3.	Mike LAMASTRA	IMNS/IMAB
4.	LOUIS BYKOSKI	LLWD/LLRB
5.	TIM JOHNSON	LLWM/LLRB
6.	Robert L. FONNER	OGC
7.	Edward Shum	LLWM/LLTB
8.	Jerry J. Swift	IMNS/IMSB
9.	MAX EL TAWIL	HERITAGE MINERALS
10.		
11.		
12.		
13.		
14.		
15.		

MINERAL COMPOSITION

Economic Minerals	Waste Minerals
Ilmenite ($TiO_2.FeO$)	Silica (SiO_2)
Leucoxene ($TiO_2.Fe_2O_3$)	Kyanite (Al_2SiO_5)
Rutile (TiO_2)	Sillimanite (Al_2SiO_5)
Zircon ($Zr\ SiO_4$)	Staurolite ($Al, Fe.SiO_3$)
Monazite ($Ca, La, Y, Th.PO_4$)	Tourmaline ($Al, Fe, B, .SiO_3$)

monazite. A phosphate of the cerium metals and the principal ore of the rare earths and thorium. Monoclinic. One of the chief sources of thorium used in the manufacture of gas mantles. It is a moderately to strongly radioactive mineral, $(CE,La,Y,Th)(PO_4)$; yellowish, reddish-brown, yellowish-brown, and green. It occurs widely disseminated as an accessory mineral in granitic igneous rocks and gneissic metamorphic rocks. Detrital sands in regions of such rocks may contain commercial quantities of monazite. It also occurs in pegmatites associated with zircon, xenotime, gadolinite, samarskite, fergusonite, magnetite, apatite, columbite, and ilmenite. Thorium-free monazite is rare. *Crosby, pp. 30-31; Fay; Dana 17.*

monazite sand. *See* monazite. *Bennett 2d, 1962.*

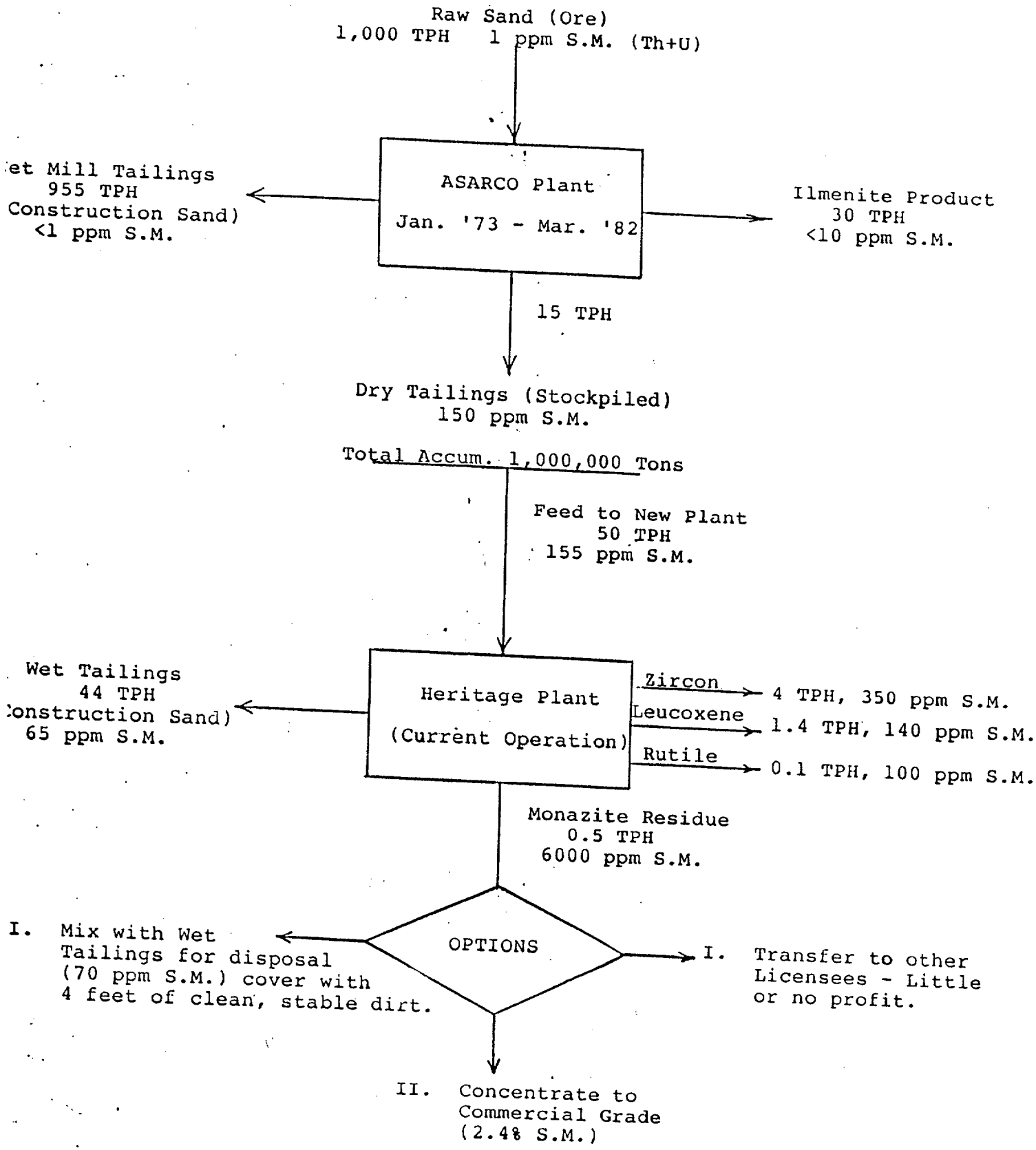


FIGURE I

PROJECT OVERVIEW

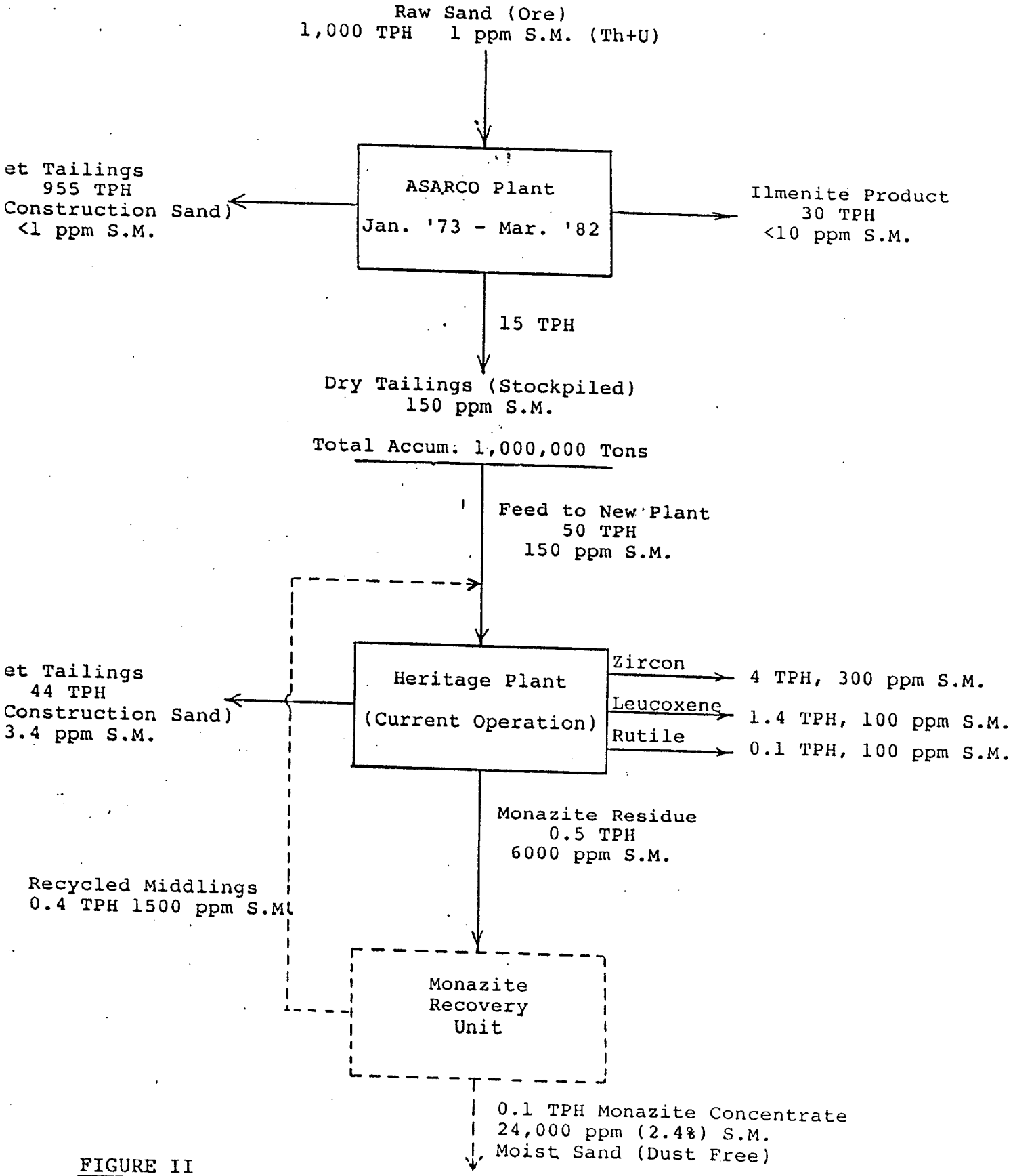


FIGURE II

MONAZITE PRODUCTION OPTION

SEPARATION TECHNOLOGY

I. GRAVITY SEPARATION:

Based on differences in specific gravities between the minerals being separated.

Silica Sand Specific Gravity 2.65
Monazite Specific Gravity 5.2

$$\text{Separation Criteria} = \frac{5.2 - 1}{2.65 - 1} = 2.55$$

Therefore, separation of silica from monazite by gravity methods (spirals and tables) can be done effectively down to the finest sand (-200 mesh).

The wet mill tailings are expected to contain little or no monazite.

II. HIGH TENSION SEPARATION:

Based on differences in surface electrical conductivity between the minerals being separated.

Ilmenite, Leucoxene & Rutile	Conductors
Monazite	Nonconductors

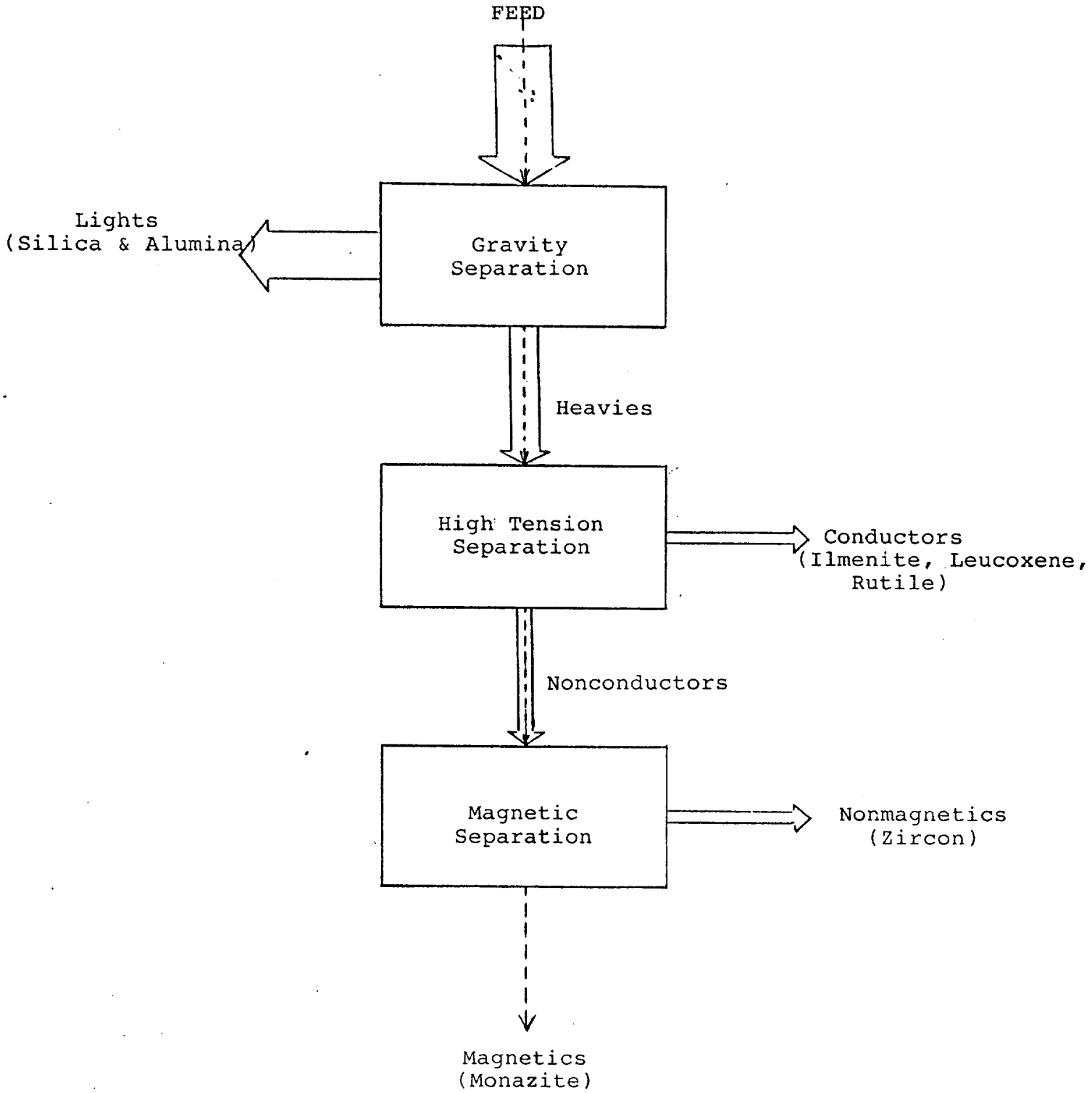
Therefore, no monazite is expected in the ilmentite, leucoxene or rutile products.

III. MAGNETIC SEPARATION:

Based on magnetic susceptibility differences between the minerals being separated.

Zircon	Nonmagnetic
Monazite	Magnetic

Therefore, no monazite is expected in the zircon product.



FATE OF SOURCE MATERIAL

IN PLANT OPERATIONS

POTENTIAL CUSTOMERS FOR MONAZITE

NAME	BUSINESS
Associated Minerals (Australia)	Produces and markets mineral sands worldwide. Has major operations in Green Cove Springs, Florida.
Rhone Poulenc (France)	Ships monazite to France for processing into various products (TV Tubes, pigments, etc.) Has major rare earth chemical plant in Freeport, Texas.
Davison Chemical Division of Grace & Co. (Baltimore, MD)	Makes Catalysts for petroleum refining in Chattanooga, Tennessee.

CONCENTRATION OF SOURCE MATERIAL IN PLANT TAILINGS COMPOSITES

Source	Conc., pci/g Th	U
Low Composite	6.3	5.7
Medium Composite	19.6	12.3
High Composite	29.4	23.6

SUMMARY OF MAXIMUM CONCENTRATIONS PERMITTED UNDER DISPOSAL OPTIONS

Kind of Material	Disposal Options			
	1 [1]	2 [2]	3 [3]	4 [4]
Natural Thorium (Th-232+Th-228) with daughters present and in equilibrium	10	50	----	500
Natural Uranium (U-238+U-234) with daughters present and in equilibrium	10	----	40	200
Depleted Uranium:				
*Soluble	35	100	----	1,000
*Insoluble	35	300	----	3,000
Enriched Uranium:				
*Soluble	30	100	----	1,000
*Insoluble	30	250	----	2,500

[1] Based on EPA cleanup standards.

[2] Concentrations based on limiting individual doses to 170 mrem/yr.

[3] Concentration based on limiting equivalent exposure to 0.02 working level or less.

[4] Concentrations based on limiting individual doses to 500 mrem/yr and, in case of natural uranium, limiting exposure to 0.02 working level or less.

OPTIONS FOR TAILINGS DISPOSAL

1. Sale for construction sand.
2. Cover with top soil and plant grass and other vegetation.
3. Pump to bottom of recreational lake.
4. Include in housing project plans.

HERITAGE'S FUTURE PLAN

1. Recycle material that contains economic concentrations of monazite, zircon and titanium to extract those values.

2. Deposit the clean sand in a separate site for use in fill or construction.

3. Continue to survey and sample the area as recycling progresses.

4. When sampling results in no more economic mineral values and the source material content is at acceptable levels, the entire property will be surveyed and decommissioned.

5. Decommissioning will be according to the requirements for Option I of the Branch Technical Position. That is, release of property for unrestricted use.

6. In the event that any remaining sand contains more Th or U than the Option I limits, but not sufficiently high to warrant recycling, Heritage may opt to cover this material with dirt or water (in the form of a recreational lake), thereby complying with Option II of the Branch Technical Position.

MINERAL COMPOSITION

Economic Minerals	Waste Minerals
Ilmenite ($TiO_2.FeO$)	Silica (SiO_2)
Leucoxene ($TiO_2.Fe_2O_3$)	Kyanite (Al_2SiO_5)
Rutile (TiO_2)	Sillimanite (Al_2SiO_5)
Zircon ($Zr\ SiO_4$)	Staurolite ($Al, Fe.SiO_3$)
Monazite ($Ca, La, Y, Th.PO_4$)	Tourmaline ($Al, Fe, B, .SiO_3$)

monazite. A phosphate of the cerium metals and the principal ore of the rare earths and thorium. Monoclinic. One of the chief sources of thorium used in the manufacture of gas mantles. It is a moderately to strongly radioactive mineral, $(CE,La,Y,Th)(PO_4)$; yellowish, reddish-brown, yellowish-brown, and green. It occurs widely disseminated as an accessory mineral in granitic igneous rocks and gneissic metamorphic rocks. Detrital sands in regions of such rocks may contain commercial quantities of monazite. It also occurs in pegmatites associated with zircon, xenotime, gadolinite, samarskite, fergusonite, magnetite, apatite, columbite, and ilmenite. Thorium-free monazite is rare. *Crosby, pp. 30-31; Fay; Dana 17.*

monazite sand. *See* monazite. *Bennett 2d, 1962.*

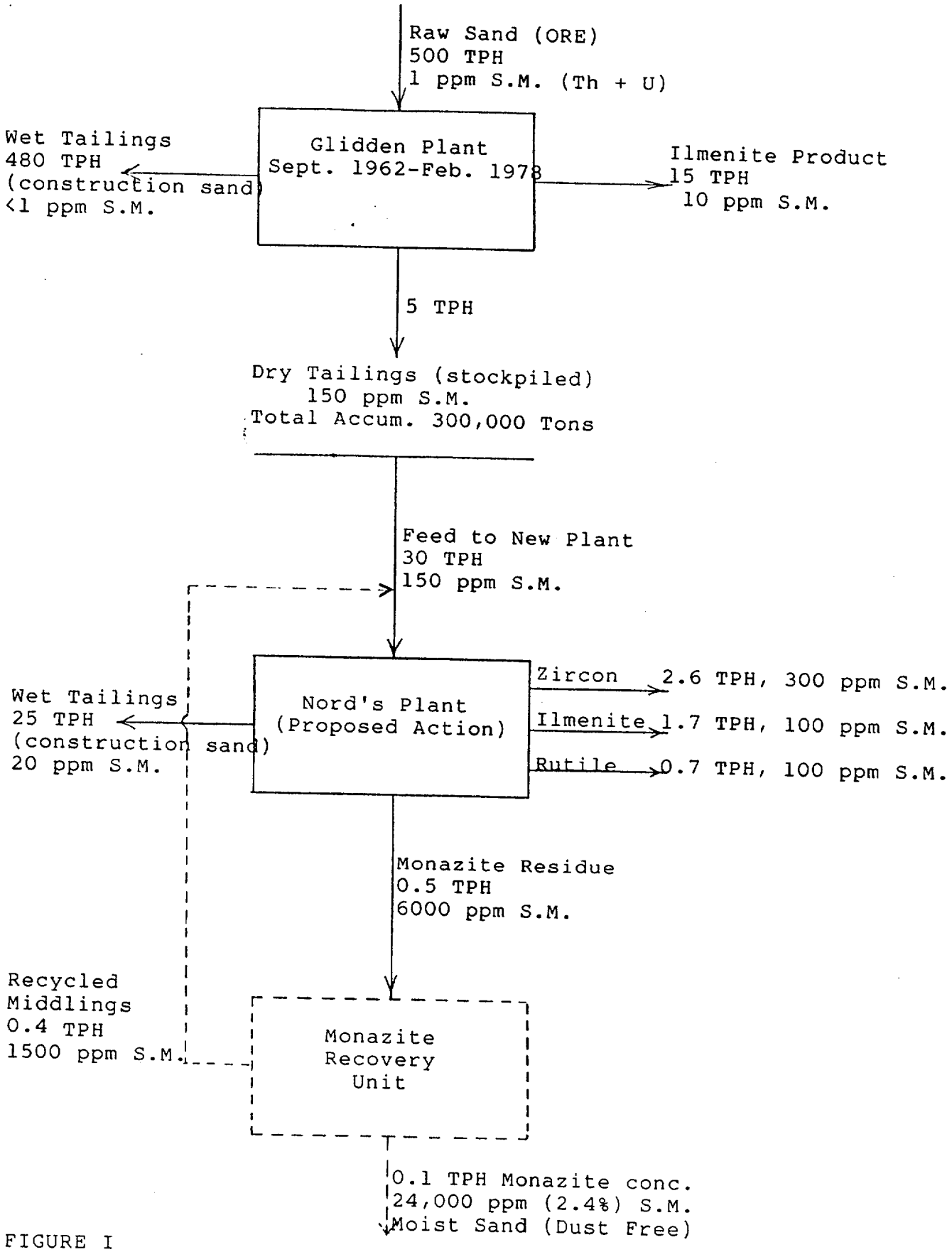


FIGURE I

PROJECT OVERVIEW

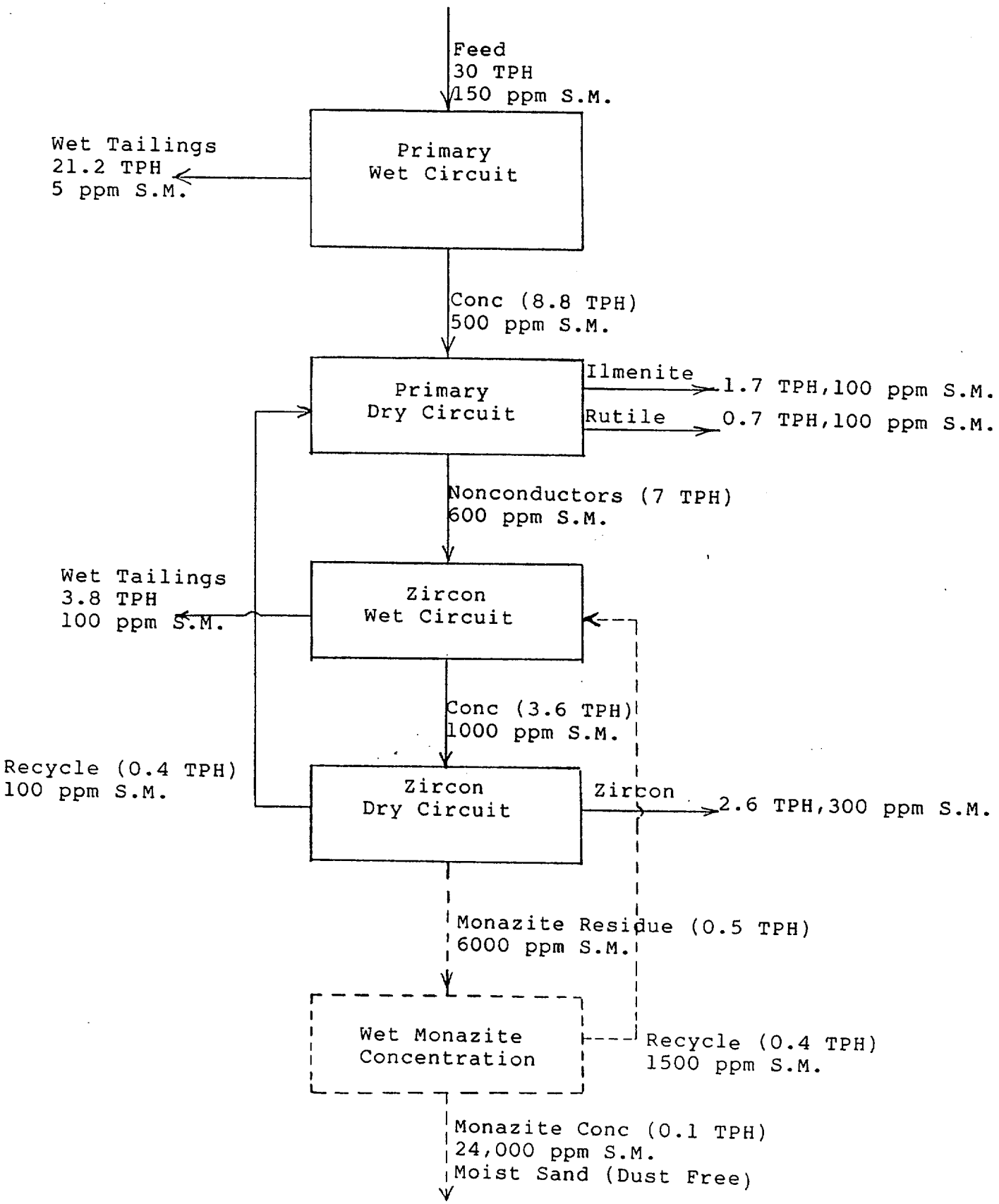


FIGURE II

PROPOSED ACTION

SEPARATION TECHNOLOGY

I. GRAVITY SEPARATION:

Based on differences in specific gravities between the minerals being separated.

Silica Sand Specific Gravity 2.65
Monazite Specific Gravity 5.2

$$\text{Separation Criteria} = \frac{5.2 - 1}{2.65 - 1} = 2.55$$

Therefore, separation of silica from monazite by gravity methods (spirals and tables) can be done effectively down to the finest sand (-200 mesh).

The wet mill tailings are expected to contain little or no monazite.

II. HIGH TENSION SEPARATION:

Based on differences in surface electrical conductivity between the minerals being separated.

Ilmenite, Leucoxene & Rutile	Conductors
Monazite	Nonconductors

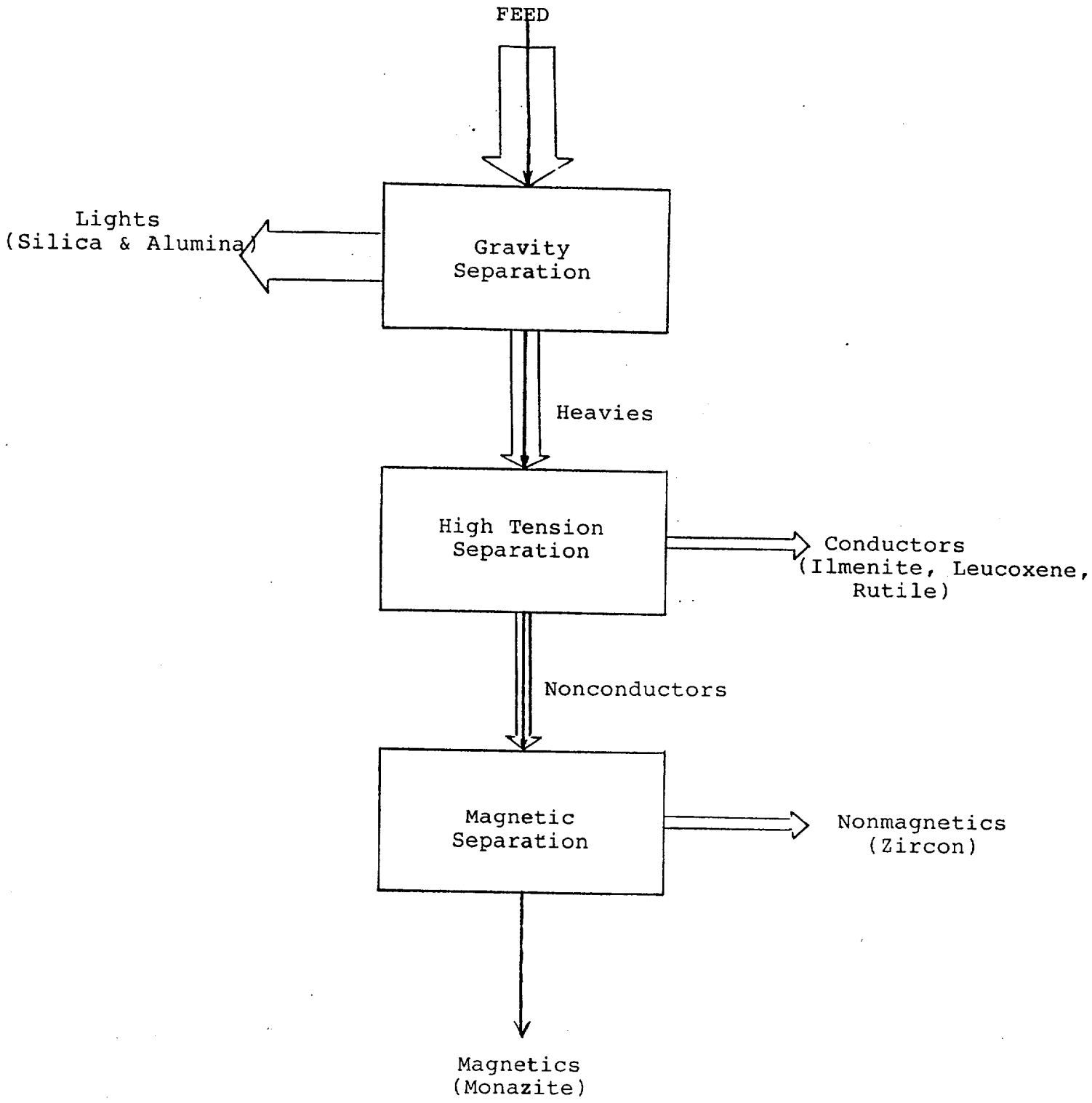
Therefore, no monazite is expected in the ilmentite, leucoxene or rutile products.

III. MAGNETIC SEPARATION:

Based on magnetic susceptibility differences between the minerals being separated.

Zircon	Nonmagnetic
Monazite	Magnetic

Therefore, no monazite is expected in the zircon product.



FATE OF SOURCE MATERIAL

IN PLANT OPERATIONS

POTENTIAL CUSTOMERS FOR MONAZITE

NAME	BUSINESS
Associated Minerals (Australia)	Produces and markets mineral sands worldwide. Has major operations in Green Cove Springs, Florida.
Rhone Poulenc (France)	Ships monazite to France for processing into various products (TV Tubes, pigments, etc.) Has major rare earth chemical plant in Freeport, Texas.
Davison Chemical Division of Grace & Co. (Baltimore, MD)	Makes Catalysts for petroleum refining in Chattanooga, Tennessee.

SUMMARY OF MAXIMUM CONCENTRATIONS PERMITTED UNDER DISPOSAL OPTIONS

Kind of Material	Disposal Options			
	1 [1]	2 [2]	3 [3]	4 [4]
Natural Thorium (Th-232+Th-228) with daughters present and in equilibrium	10	50	----	500
Natural Uranium (U-238+U-234) with daughters present and in equilibrium	10	----	40	200
Depleted Uranium:				
*Soluble	35	100	----	1,000
*Insoluble	35	300	----	3,000
Enriched Uranium:				
*Soluble	30	100	----	1,000
*Insoluble	30	250	----	2,500

[1] Based on EPA cleanup standards.
[2] Concentrations based on limiting individual doses to 170 mrem/yr.
[3] Concentration based on limiting equivalent exposure to 0.02 working level or less.
[4] Concentrations based on limiting individual doses to 500 mrem/yr and, in case of natural uranium, limiting exposure to 0.02 working level or less.

Hazen Research, Inc.
4601 Indiana St. • Golden, Colo. 80403
Tel: (303) 279-4501 • Telex 45-860
FAX: (303) 278-1528

DATE	January 16, 1990
HRI PROJECT	002-16-U
HRI SERIES NO.	A73/90
DATE RECD.	1/5/90
CUST P.O.#	None Recd.

Nord Ilmenite Corporation
Mr. Ed Albrethsen
RD 2, Box 366A, Route 571
Jackson, New Jersey 08527

GAMMA SPECTROMETRY ANALYSIS

SAMPLE NUMBER	SAMPLE IDENTIFICATION	Equivalent Uranium, ppm	pCi/g	Equivalent Thorium, ppm	pCi/g	Equivalent Potassium, %
Feed A73-1	T1 1956 21901-1	44	14.6	128	13.9	<1
Tailings -2	T1 1956 21928-10	<10	<3	14	1.5	<1
-3	101 Ilmenite	<10	<3	72	7.8	<1
-4	101 Zircon	274	91	105	11.4	<1
-5	Rutile Carpco #21922-9	36	12	25	2.7	<1

A73-1 Feed - pilot plant
-2 Tailing " " → reject from plant
3 First Ilmenite shipment
4 Zircon product 11/29/89
5 - Rutile pilot plant

By:
Laboratory Manager